ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ АВТОНОМНОЕ ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ
«САНКТ-ПЕТЕРБУРГСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ, МЕХАНИКИ И ОПТИКИ»

Факультет безопасности информационных технологий
Кафедра проектирования и безопасности компьютерных систем

Дисциплина:
«Операционные системы»

ОТЧЕТ О ВЫПОЛНЕНИИ ЛАБОРАТОРНОЙ РАБОТЫ №5

Выполнил:
Студент гр. N3247 Гаврилова В. В.

Проверил:
Ханов А. Р.

Санкт-Петербург
2021г.

Задание:

Выбрать 3 (или больше) файловых систем, выбрать методику проверки и найти лучшую из них.

Выполнение:

Создадим скрипт, который монтирует диск с файловой системой и замеряет время вывода, копирования и удаления файла.

Для файловых систем ext4, ext3, ext2 и ntfs

```
dd of=rand.bin if=/dev/urandom bs=1M count=128
for fs in ext4 ext3 ext2 ntfs;
do
        echo "__________Fs is $fs";
        dd if=/dev/zero of=$fs.bin bs=1M count=512;
        mkfs -t $fs -F $fs.bin;
        mkdir -p m/$fs;
        mount $fs.bin m/$fs/;
        cp rand.bin m/$fs/;
        cd m/$fs;
        time echo rand.bin > /dev/null;
        time cp rand.bin testcp.bin;
        time rm rand.bin;
        cd ..
        umount $fs;
        cd ..
        rm -rf $fs;
        rm -rf $fs.bin;
done

rm rand.bin
```

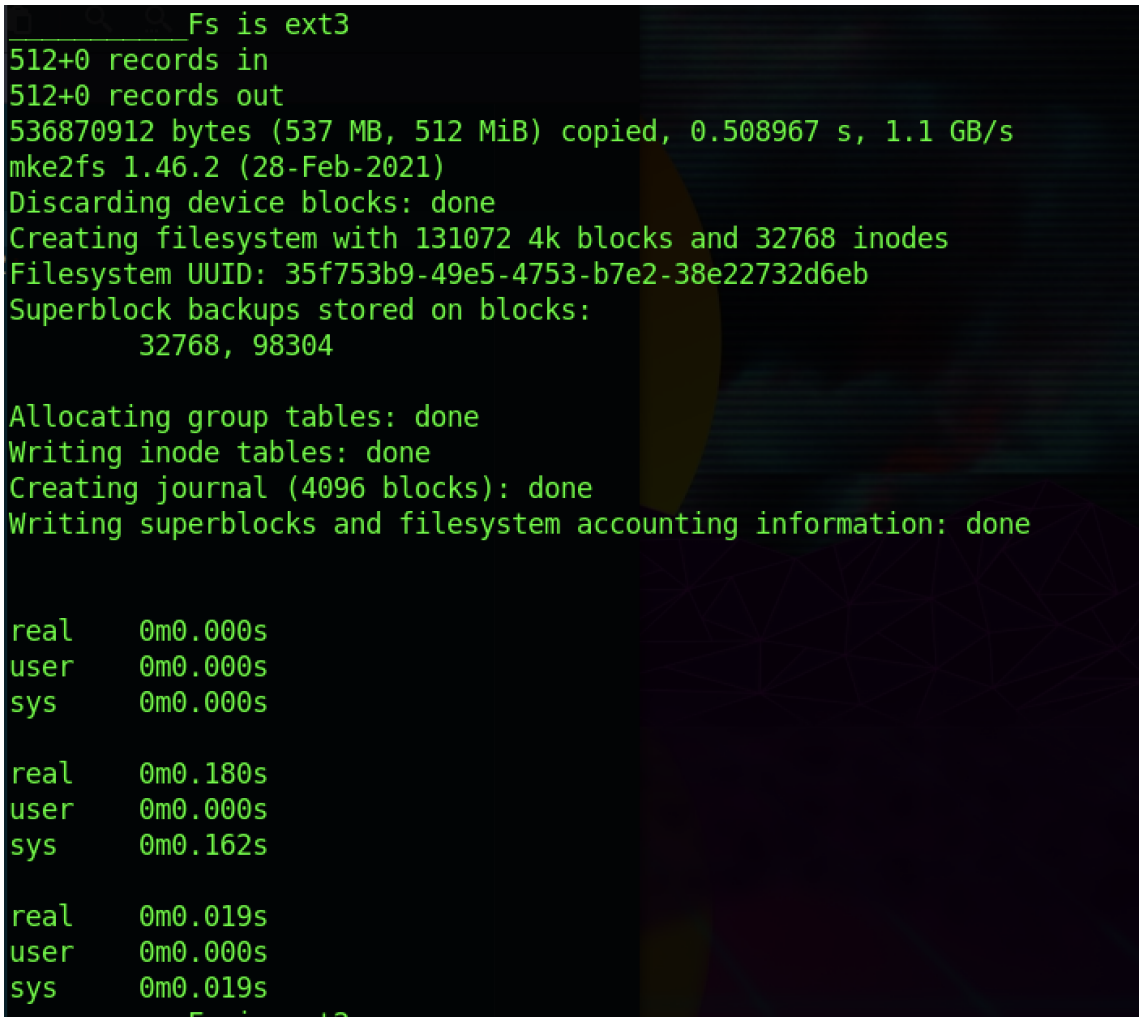
Для файловой системы fat

```
dd of=rand.bin if=/dev/urandom bs=1M count=128
for fs in fat;
do
        echo "_____Fs is $fs";
        dd if=/dev/zero of=$fs.bin bs=1M count=512;
        mkfs -t $fs -F 32 $fs.bin;
        mkdir -p m/$fs;
        mount $fs.bin m/$fs/;
        cp rand.bin m/$fs/;
        cd m/$fs;
        time echo rand.bin > /dev/null;
        time cp rand.bin testcp.bin;
        time rm rand.bin;
        cd ..
        umount $fs;
        cd ..
        rm -rf $fs;
        rm -rf $fs.bin;
done

rm rand.bin
```

Вывод:
Ext4:

```
_____Fs is ext4
512+0 records in
512+0 records out
536870912 bytes (537 MB, 512 MiB) copied, 0.695459 s, 772 MB/s
mke2fs 1.46.2 (28-Feb-2021)
Discarding device blocks: done
Creating filesystem with 131072 4k blocks and 32768 inodes
Filesystem UUID: d00a36e5-3d52-4f9b-bfce-8eda0d5a9e01
Superblock backups stored on blocks:
        32768, 98304

Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done


real    0m0.000s
user    0m0.000s
sys     0m0.000s

real    0m0.163s
user    0m0.000s
sys     0m0.118s

real    0m0.016s
user    0m0.000s
sys     0m0.016s
```

Ext3:


Fs is ext3
512+0 records in
512+0 records out
536870912 bytes (537 MB, 512 MiB) copied, 0.508967 s, 1.1 GB/s
mke2fs 1.46.2 (28-Feb-2021)
Discarding device blocks: done
Creating filesystem with 131072 4k blocks and 32768 inodes
Filesystem UUID: 35f753b9-49e5-4753-b7e2-38e22732d6eb
Superblock backups stored on blocks:
32768, 98304
Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done
real 0m0.000s
user 0m0.000s
sys 0m0.000s
real 0m0.180s
user 0m0.000s
sys 0m0.162s
real 0m0.019s
user 0m0.000s
sys 0m0.019s

Ext2:

```
sys     0m0.019s
__________Fs is ext2
512+0 records in
512+0 records out
536870912 bytes (537 MB, 512 MiB) copied, 0.536974 s, 1000 MB/s
mke2fs 1.46.2 (28-Feb-2021)
Discarding device blocks: done
Creating filesystem with 131072 4k blocks and 32768 inodes
Filesystem UUID: 66e25479-546e-4164-b4a3-dc50a7439169
Superblock backups stored on blocks:
        32768, 98304

Allocating group tables: done
Writing inode tables: done
Writing superblocks and filesystem accounting information: done


real    0m0.000s
user    0m0.000s
sys     0m0.000s

real    0m0.188s
user    0m0.004s
sys     0m0.159s

real    0m0.015s
user    0m0.000s
sys     0m0.015s
          Fs is ntfs
```

Ntfs:

```
__________Fs is ntfs
512+0 records in
512+0 records out
536870912 bytes (537 MB, 512 MiB) copied, 0.487493 s, 1.1 GB/s
ntfs.bin is not a block device.
mkntfs forced anyway.
The sector size was not specified for ntfs.bin and it could not be ob
lly.  It has been set to 512 bytes.
The partition start sector was not specified for ntfs.bin and it coul
 automatically.  It has been set to 0.
The number of sectors per track was not specified for ntfs.bin and it
ained automatically.  It has been set to 0.
The number of heads was not specified for ntfs.bin and it could not b
tically.  It has been set to 0.
Cluster size has been automatically set to 4096 bytes.
To boot from a device, Windows needs the 'partition start sector', th
ack' and the 'number of heads' to be set.
Windows will not be able to boot from this device.
Initializing device with zeroes: 100% - Done.
Creating NTFS volume structures.
mkntfs completed successfully. Have a nice day.

real    0m0.000s
user    0m0.000s
sys     0m0.000s

real    0m1.919s
user    0m0.029s
sys     0m0.353s

real    0m0.014s
user    0m0.000s
sys     0m0.011s
```

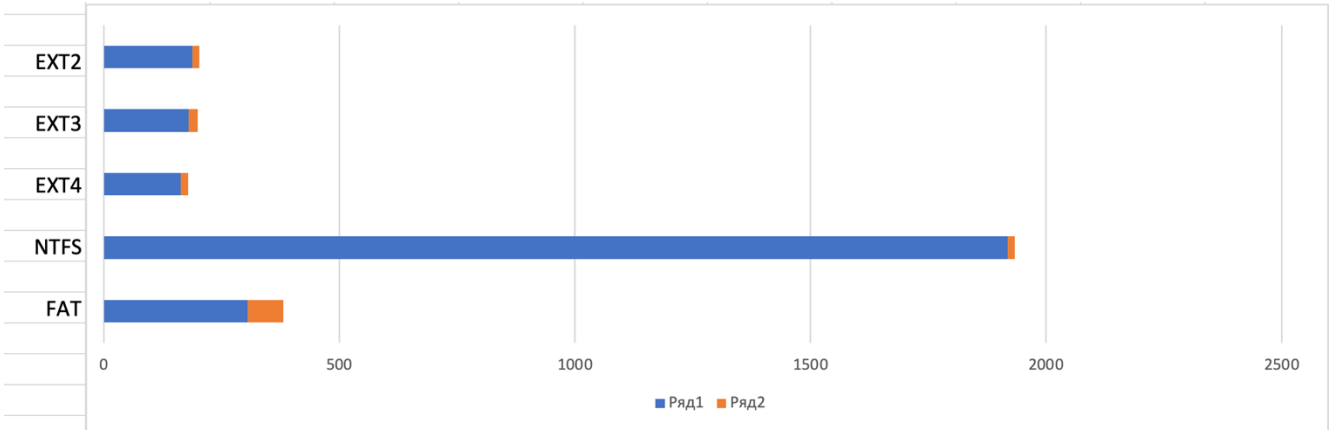
Fat:

```
128+0 records in
128+0 records out
134217728 bytes (134 MB, 128 MiB) copied, 4.10405 s, 32.7 MB/s
_____Fs is fat
512+0 records in
512+0 records out
536870912 bytes (537 MB, 512 MiB) copied, 0.601875 s, 892 MB/s
mkfs.fat 4.2 (2021-01-31)

real    0m0.000s
user    0m0.000s
sys     0m0.000s

real    0m0.305s
user    0m0.000s
sys     0m0.170s

real    0m0.076s
user    0m0.000s
sys     0m0.074s
```

1

Сравнение:

Файловая система	FAT	NTFS	EXT4	EXT3	EXT2
Вывод	0m0, 000s	0m0, 000s	0m0, 000s	0m0, 000s	0m0, 000s
Копирование	0m0, 305s	0m1, 919s	0m0, 163s	0m0, 180s	0m0, 188s
Удаление	0m0, 076s	0m0, 014s	0m0, 016s	0m0, 019s	0m0, 015s



Сразу видно, что наиболее быстрая файловая система ext4, а самая медленная – ntfs.